CHAPTER V

THE NAVY FACILITIES SYSTEM

During the ten year period under consideration, the Navy Facilities System was the single automated data processing system sponsored by the Naval Facilities Engineering Command. The Facilities System was composed of automated data systems that were organized to provide an interfaced data base for all aspects of the facilities business. These data systems were described functionally in terms of three processes: requirements, acquisition, utilization and three major subsystems: real property, utilities, civil engineer support. The data base concept depended on the availability of a common denominator to structure the system. For the real property and utilities subsystems, the common denominator was the facility category code. This was also true, in part, for the civil engineering support subsystem. Additionally, those hardware items which resulted in real property when assembled and put in place were indexed by facility category codes.

Construction personnel and hardware, such as pontoons and automotive and construction equipment, could not be indexed by facility category codes. For products of the civil engineer support subsystem, the common element was a functional allowance stated in terms of manpower and hardware. This functional allowance formed the basis of all requirements and was compared to the Basic Facilities Requirements List

for real property. The Navy Facilities System data base included information on:

a. Naval facility requirements, assets, deficiencies and excesses.

b. Construction, automotive, and special equipment and in-use allowance inventory.

c. Advanced Base Functional Components.

d. Class 2C material stock inventory items.[1]

Organizationally the Navy Facilities System consisted of two parts. The first, a Command Management Information System that served Command Headquarters, Engineering Field Divisions, Construction Battalion Centers, Public Works Centers and the Civil Engineering Laboratory. The second was a group of functional automated data systems that had a Navy-wide application in: shore facilities planning and real estate; military construction programming; support for the Naval Construction Force; construction, automotive and special equipment; public works departments and environmental protection.[2]

The Navy management systems for planning, acquiring and maintaining facilities were developed over a long period of time and became generally standardized. These management systems were adapted to the use of automatic data processing and data base/telecommunications

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[1] Navy Facilities System, NAVFAC P-424 (June 1974).

[2] Ibid.

technology. As in other Navy systems, a total approach was not really possible until the late 1960s. This resulted in uncoordinated management information systems and in data files that were incompatible and duplicative. However, progress was made in establishing common data element definitions and interfacing files to the maximum possible extent.[3]

A noteworthy event of the 1970s was the adaptation of data systems to telecommunications or "teleprocessing." Great efficiency and effectiveness were possible through reduced input time, more accurate data discipline and improved delivery time for outputs. Report requirements were often reduced by query capability. Each data system had to be carefully evaluated to assure that additional costs of teleprocessing were compensated by tangible benefits.[4]

In the early years of data processing development, many users felt they were being forced to utilize an information system designed not to meet their needs but rather for the convenience of the computer and programmers. This resulted primarily because users had not yet developed or acquired the talent to know what data processing support could do to augment management.[5]

By the early 1970s, management had reached the point where this situation no longer prevailed. Many organizations within the Command

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[3] Navy Facilities System.

[4] Ibid.

[5] Ibid.

had people knowledgeable not only in management requirements but also in what automated data processing systems could or could not be expected to do. This change was recognized and as a result, the Chief of Naval Material issued an instruction.[6] This instruction stated:

> ". . . a natural division of labor has taken place between what are commonly called management system analysts and computer system analysts. Management system analysts tend to be concerned with the definition of management's problems. Computer system analysts are involved with devising computer-supported systems to solve management's identified and defined problems."[7]

In order to coordinate and administer the management system analysts' role in the definition of automated data processing requirements of management information systems, it was necessary to establish a new role --that of "system proponent".[8]

The Navy Facilities System proponent was the Commander of the Naval Facilities Engineering Command. He was responsible for the overall direction and control of the Navy Facilities System.

The program managers, referred to as the particular system's proponents, were the assistant commanders at Headquarters who were responsible for each of the parts of the Facilities System.[9]

A subsystem proponent was appropriate for the management information systems which transcended the traditional organizational lines. Systems

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[6] NAVMAT Instruction 5200.14A of 23 Oct 1970, Change 1.

[7] Michael Gall, "FACSO Puts It All Together," The Navy Civil Engineer (Summer 1971).

[8] Ibid.

[9] See Chart 1 which shows the relationship of the program managers and the management information systems at the end of 1974.

such as the Headquarters Management Information System and the Engineering Field Division Management Information System operated in many functional areas and required precise coordination of efforts. The program manager was assisted by experts knowledgeable in the different subsystems which made up a particular Navy Facilities System component or program.

The working proponents handled the more detailed aspects of day-to-day development and operation of the Navy Facilities System. These individuals were the direct agents of the program managers and as such were the representatives of Command management.

The geographical location of a working proponent was important and required that he be located where he could best coordinate the day-to-day tasks between the Facilities Systems Office at Port Hueneme and the system user. For some systems the working proponent at Command Headquarters provided the necessary coordination. In other systems, however, it was necessary to augment the proponency organization with personnel in the field closer to the customer or to the Port Hueneme Facilities Systems Office. When this was necessary, the working proponent was designated a field working proponent.[10]

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[10] LT Harry J. Brown, Jr., CEC, USN, "Role of the Proponent in the Naval Facilities System," The Navy Civil Engineer (Fall 1973).

CHART 5-1 MANAGEMENT INFORMATION SYSTEM
PROGRAM MANAGERS AS OF JUNE 1974

Management Information System	Program Manager
Headquarters	Director of Programs and Comptroller
Engineering Field Division	Director of Programs and Comptroller
Construction Battalion Center	Assistant Commander for Military Readiness
Public Works Center	Assistant Commander for Operations and Maintenance
Navy Facility Assets Data Base	Assistant Commander for Facilities Planning and Real Estate
Shore Facilities Planning	Assistant Commander for Facilities Planning and Real Estate
Military Construction Programs	Assistant Commander for Military Construction Programming
Civil Engineer Support	Assistant Commander for Military Readiness
Construction, Automotive and Special Equipment	Assistant Commanders for Military Readiness and Operations and Maintenance
Public Works Department	Assistant Commander for Operations and Maintenance
Environmental Quality Data System	Assistant Commander for Operations and Maintenance
Engineering Research System	Assistant Commander for Research and Development

DATA PROCESSING SUPPORT

At the end of the Second World War, the electric accounting machine installation at the Naval Construction Battalion Center, Port Hueneme, California, was utilizing punch card IBM equipment for maintaining stock records on mobilization reserve equipment. At that time, the office employed thirty-five civilian employees.

When the Bureau of Yards and Docks[11] Support Office was established at Port Hueneme, in 1948, the accounting machine services were utilized on a centerwide basis. The data processing services were applied to repair part stock record keeping, payroll, personnel, and allotment and bond accounting. The services were available to any department, component or tenant activity at the Port Hueneme Center.

From 1949 to 1953, accounting machine applications were again expanded to include additional services for the Bureau of Yards and Docks. The Functional Component Catalogue was placed on electric accounting machine cards while controlled maintenance accounting for automotive and public works type functions were developed on a punch card system. In 1954, the Bureau of Yards and Docks requested the mechanization of records on all real property owned or controlled by the Navy throughout the world. This program became one of the largest projects, in volume and in scope, ever undertaken by the data processing service at the Construction Battalion Center. In 1955, the

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[11] The Bureau of Yards and Docks became the Naval Facilities Engineering Command on 1 May 1966.

Bureau requested the Center to prepare consolidated stock status reports on mobilization reserve stocks maintained at the three Construction Battalion Centers: Davisville, Rhode Island, Gulfport, Mississippi, and Port Hueneme, California. This step paved the way for things to come, such as single data base management.

The ever growing size of punch card files, increasing workload requirements and the need for improved turnaround necessitated the use of an electronic computer and additional personnel. Thus, in 1959, the IBM 705 System was installed at the center. The acquisition of this system produced a monumental step upward in capability with a very large reduction in the cost per capability unit.

The Model 705 was a vacuum tube machine which proved to be a reliable workhorse which endured for seven years.[12] In the mid-1960s, however, it was necessary to augment the capability of the Model 705 by the addition of an IBM Model 1401 computer. This addition was necessary because of added customer support requirements and a desire to improve the efficiency of the IBM 705. As the workload contined to increase, two more IBM Model 1401s were added.

Demands for data processing services continued to increase. These demands together with the impact of the Southeast Asia situation on Naval Construction Force support triggered the need for third-generation

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[12]Michael Gall, "FACSO Puts It All Together."

computer equipment. Thus, in late 1966 an IBM System 360 Model 40 was acquired. This system more than tripled the computing power of the installation.[13] Additionally, it provided for processing in a multi-programming mode, and for the eventual release of the older compiler.

On 20 October 1967, the Chief of Naval Material designated the Port Hueneme Center's data processing organization as a Data Processing Service Center. This service center was assigned the responsibility of providing data processing support to the Construction Battalion Center's various tenant activities as well as to other designated west coast activities.[14]

Along with the designation as a service center came additional demands for service. Because of these increased demands, it was necessary to augment the capability of the service center by contract. By 1969 the extensive use of commercial computer time provided a sound basis for the acquisition of a second IBM 360 Model 40 System.

Meanwhile, however, the Chief of Naval Material assigned to the Naval Facilities Engineering Command the responsibility for the design and maintenance of a uniform management and automatic data processing system for service-wide applications in the functional area of facilities.[15]

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[13] Michael Gall, "FACSO Puts It All Together."

[14] CNM ltr to NAVFAC of 20 October 1967 (Ser: MAT-01431/575:RJJ), subj: Establishment of a Data Processing Service Center at the Construction Battalion Center, Port Hueneme, California.

[15] NAVFAC Notice 5230 of 7 October 1968.

As an initial step in the development of a total facilities system for Navy-wide application and use, the Command presented a preliminary plan and concept to the Chief of Naval Material for the development of the public works elements of a facilities system module for the Naval Ordnance Management Information System. The plan, scope and concept were accepted. The developmental effort was conducted at the Naval Ordnance Station, Indian Head, Maryland, to permit the simultaneous development of automatic data processing programs and systems by Naval Ordnance Management Information System personnel. To coordinate the development of the Naval Facilities System, to establish disciplines and to ensure that the system's effectiveness, integrity, and documentation were maintained, the Command formed a Command Coordinating Group.[16]

The Command Coordinating Group, however, was shortlived. It was disestablished early in 1969 and at the same time, the Navy Facilities System Group was established. The System Group served as a central point of contact at Headquarters for systems development and coordination. Furthermore, this group was responsible for the analysis, development, test, evaluation, acquisition and production of management information and data systems in support of the Navy Facilities System, its subsystems and their component programs.[17]

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[16] NAVFAC Notice 5230 of 7 October 1968.

[17] NAVFAC Notice 5450 of 3 July 1969.

Although the System Group had an on-site Data Systems Design Detachment at San Diego, California, to support the Public Works Center Management Information System and another detachment at Indian Head, Maryland, to support the Public Works Department module of the Naval Ordnance Standard Management System, it did not possess a staffed central systems design and maintenance office for field systems. This deficiency was eliminated by the establishment and staffing of such an office at the Naval Construction Battalion Center, Port Hueneme, California.[18]

Thus, effective 20 August 1969, the Naval Facilities Engineering Command Facilities Systems Office (FACSO) was established as a staff office of the Port Hueneme Construction Battalion Center.[19] Concurrently, the center's Data Processing Division was disestablished and its functions assigned to the new office. Furthermore, additional functions were assigned to the field office by Command Headquarters.

At the time of its establishment, FACSO was responsible for providing systems, programming, and operations support on a central processing basis to three Naval Construction Battalion Centers, five Engineering Field Divisions located within the continental limits of the United States, five Public Works Centers also located within the continental limits and three other naval commands.

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[18] NAVFAC Notice 5450 of 3 July 1969.

[19] NCBC, Port Hueneme Notice 5450 of 21 August 1969.

To further reduce equipment cost and to improve the core storage capacity at FACSO, a leased IBM 360 Model 50I System was obtained. This system was installed in May 1970 as a total replacement for the two IBM 360 Model 40 computers.

Another important event in 1970 was the establishment of a Command telecommunications network between Port Hueneme, the other Construction Battalion Centers and the stateside Engineering Field Divisions. This was a network of leased telephone circuits for off-line telecommunications from each of the customer activities.

At the remote end of the telecommunications linkage, the equipment generally included a card reader and a high speed printer.

Card transactions of data were key punched in the field, images of those cards were read onto magnetic tape, and the data transmitted to FACSO. At FACSO the data were processed,generally on a standard system along with transactions from other like activities. Reports by the data processing system were created on magnetic tapes which were transmitted back to the field, where the reports were printed and delivered to the appropriate user.

Depending upon production schedules within FACSO, turnaround time from transmission of transactions to receipt of reports within the field activities organization were as short as two or three hours. However, most information requirements were not that demanding and, in general, overnight or two-day turnaround was the norm.

Not long after third generation computers were introduced in the mid-1960s it was determined that they could handle numbers and data

faster than the information could be fed into them. For this reason, companies began looking for ways to get data into the computer faster.[20]

Thus in 1970, the Command began evaluating operational systems for possible use at FACSO. On completion of the Command evaluation, it was decided that while all of the systems contributed some improvement over the standard keypunch/verify operations, the key-to-disk-to-tape system, also called a shared processor system, was the most flexible with the best prospects for increasing throughput.

Therefore in October 1970, the Command requested approval from the Chief of Naval Operations to install a key-to-disk-to-tape system at FACSO. The Chief of Naval Operations, however, deferred all action on requests for key entry pending an evaluation of two existing systems. This evaluation was not completed until late 1971. It did document the economy of a shared processor system over keypunch/verify equipment because of increased operator productivity. And so, in September 1972, a Computer Machinery Corporation Key Processing System was installed at FACSO. The system consisted of a supervisory console housing a small computer and a magnetic tape unit, a separate disk and eighteen keystations.

Each keystation operated independently of and simultaneously with the other stations on the same, or differing jobs and formats in any combination. All keystations were connected to and controlled by the computer, using a manufacturer furnished stored operating system.

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[20] LCDR W. G. Matthews, "Key Entry System for FACSO," The Navy Civil Engineer (Spring 1973).

Data were entered through the keystation which consisted of the standard keyboard with several special keys and a display panel visually showing what characters and field entries were made. The data were processed and stored on a disk. To verify recorded data, a complete record was retrieved from the disk and stored in the computer for comparison with the source document. After verification, completed batches of work were transferred from the disk to tape for processing by the main computer.

Meanwhile, in the latter part of 1971, it was realized that the IBM 360/50I System needed augmentation. This need for equipment upgrade was substantiated by a significant expenditure for commercial support. The requirement for commercial support snowballed with the implementation of centralized systems at FACSO and the addition of new applications of considerable size. Additionally, computer support to other naval commands increased.

In early 1972 FACSO was given permission to lease a System 360 Model 65.[21] This permission was granted because the System 360 Model 50 had reached the saturation point and a continuing workload increase was projected. As a result, in October 1972, the System 360 Model 50 was replaced by the System 360 Model 65. Although the new computer was more expensive, the cost was more than offset because it enabled FACSO

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[21] The Navy Facilities System and FACSO, An Overview (undated brochure), FACSO.

to undertake the processing for Pacific Ocean Area activities, and also to discontinue extensive contractual processing. The centralization of the Pacific Ocean Area data processing support at FACSO permitted the Command to turn over its Bangkok Computer Center to the Department of State. This resulted in an annual cost reduction of $252,000.[22]

Early in 1973, to effectively increase the workload throughout, FACSO installed sixteen high-speed TELEX tape units. These units replaced twenty-four Potter tape units. In addition, twelve ITEL disk drives replaced thirty-two Potter disk drives. The ITEL disk drives provided increased data storage capability, faster access to data and faster transfer of data.

During the same year, the data telecommunications network was upgraded to break the transmission bottleneck. Although this action increased expenditures by $74,000 annually, it eliminated the need to increase operations personnel at a greater cost.

A noteworthy Facilities Systems Office event occurred in 1973 when the Remote Job Entry System was inaugurated. Using this system, data were fed directly into the computer from remote job entry terminals located thousands of miles away. These data were then processed, and returned just as if the computer was located next door.

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[22]John N. Dano, "Data Processing Trends," The Navy Civil Engineer, (Fall 1973).

Prior to this time, all data transmission had been off-line--that is, data were assembled, transmitted electronically or physically carried by airplane, and then fed into the computer. This process involved much human intervention at various operational stages and was therefore time consuming and inefficient.[23]

On 21 May 1973, a Data 100 Model 70 remote batch terminal system was installed at the Facilities Systems Office. This was followed by the shipment of a Model 70-1 reader and printer to the Command's Pacific Division in Hawaii. Installation of these two machines marked the first step in the establishment of the prototype Remote Job Entry system. This Port Hueneme-Hawaii link was put into operation on 15 November 1973. The Pacific Division was chosen as the first link in this new network because of its large automatic data processing requirement.[24]

The greatest obstacle to the Remote Job Entry linkage was the high cost of transatlantic cable lines. Costs were kept to a minimum, however, by sharing a line with the Navy Astronautics Group at Point Mugu, California.[25]

The Remote Job Entry system was later installed at all of the Engineering Field Divisions located within the continental United States as well as the Construction Battalion Centers and several other naval activities.

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[23] CDR J. T. Burton, "PACDIV Goes on FACSO Teleprocessing Line," The Navy Civil Engineer (Summer 1973).

[24] 1973 Command History, Naval Construction Battalion Center, Port Hueneme, California.

[25] Ibid.

MANAGEMENT INFORMATION SYSTEMS

Management information systems[26] were formalized networks for collecting, processing and communicating business and logistic information to management. The primary purpose of a system was to assist management in the decision-making functions of planning, organizing, directing and controlling; and the appraisal functions of scheduling, cost and technical performance measurement. A management information system could comprise all or part of a management system. The system could be automated, manual or a combination of both.[27]

By the end of 1974 there were twelve systems using automated data systems. A brief description of each of these systems follows.

Headquarters Management Information System

The Headquarters Management Information System was a collection of data systems which provided automatic data processing support to systems proponents at Command Headquarters. The largest data system was the Master Activity General Information Control (MAGIC) System which provided consistent shore activity indexing to data systems across the entire Navy Facilities System. Other applications were: Maintenance Cost Analysis Report, Unfunded Facility Deficiencies, the Family Housing Survey, Minor Construction and Repair Special Projects, the Pesticides

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[26]The term "management information system" is considered to be synonymous with the term "management information/data system."

[27]NAVFAC Instruction 5200.23 of 22 Apr 1971.

Usage Reporting System, the Deficiency Analysis Data System and the Civil Engineer Corps Personnel System.[28]

Many of the data systems within the Headquarters System were developed before the advent of modern systems concepts and data processing techniques. They were designed and implemented on a piecemeal basis and little capability, if any, existed for integration of files or functions. Such systems were electric accounting machine oriented, relying on restricted methods of processing and having little, if any, exchange of data between them. Budgetary limitations permitted only the most austere modifications to maintain currency. The Naval Material Command Support Activity at Arlington, Virginia in the mid-1970s developed a Master Plan[29] for improving the computer environment supporting business and logistic requirements of Naval Material components in the National Capital Region. When implemented, the plan should optimize the performance of unique Headquarters Management Information System data systems and provide additional standard Naval Material Command systems for those functionally similar at other systems commands.[30]

Engineering Field Division Management Information System

Prior to the advent of the Engineering Field Division Management

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[28] Navy Facilities System.

[29] NAVMAT Instruction 5200.36.

[30] Navy Facilities System.

Information System, there were many systems developed locally by Engineering Field Divisions in an attempt to meet the informational requirements of each division. None of these systems were integrated, and more often than not, information or data in one system could not be reconciled to another system without an inordinate amount of manual effort. These local systems had to be used redundantly with other Headquarters systems requiring the same data to be loaded into multiple systems such as Military Construction Accounting and Construction Management. The total systems costs required for processing these systems were in excess of $1.5 million per year.

With the Engineering Field Division Management Information System there was an interface between Military Construction Accounting and Construction Management. Data that formerly had to be redundantly loaded into each system could, after the development of the Engineering Field Division Management Information System, be loaded into Military Construction and shared between the two systems. In addition the new system allowed for the creation of standard systems processed at one site, FACSO, for areas such as the Resources Management System, the Integrated Program Management System, and the Design Management Information System. Prior to this time, each of these systems were processed separately at the field divisions.[31]

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[31] Navy Facilities System.

Construction Battalion Center Management Information System

The Construction Battalion Center Management Information System was a Command management information system which supported the three Construction Battalion Centers and Command Headquarters requirements. Automatic data processing support was provided by FACSO via telecommunications to the three centers and through them to the Naval Construction Force, fleet units and tenant commands.

The major data systems were Supply Support, Financial, Public Works and the Construction Equipment Department Management Information System. The financial data systems provided payroll services to the Engineering Field Divisions as well as a personnel data bank, individual master personnel record documents, and prescribed personnel information displays. There were direct interfaces between the Construction Battalion Battalion Center Management Information System and the Civil Engineer Support Management Information System and Construction, Automotive and Special Equipment Management Information System. There were also some unique programs processed at each Construction Battalion Center. Specifically, these unique programs included, complete financial accounting for tenants and offsite users and some supply reports.

The Construction Equipment Department data system consisted of a series of unique reports generated for the Construction Equipment Department at Davisville by FACSO; a series of management reports at Gulfport; and a series of FACSO generated reports tailored from other systems in support of the Construction Equipment Department, Port Hueneme.[32]

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[32] Navy Facilities System.

Public Works Center Management Information System

The Public Works Center Management Information System was developed by the Command primarily to meet the various levels of managment requirements by providing the forms and reports for procedures at the Public Works Centers. In 1966, San Diego was selected as the pilot activity to implement the system.

Since 1966 the system grew until in 1974 it encompassed applications in support of public works management including transportation equipment operations and maintenance, the production and allocation of utilities, the control of facility maintenance, material inventory control and requisitioning of planned material requirements and financial accounting. Unlike most systems, the Public Works Center Management Information System was centrally designed and maintained at San Diego, but automatic data processing support was provided regionally by either the centers themselves or local data processing service centers.[33]

Navy Facility Assets Data Base

The Navy Facility Assets Data Base was a single source of information on facilities for use in planning, management and inventory. This data base was of focal importance to the whole Navy Facilities System since almost every Command program depended on accurate data

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[33] Navy Facilities System.

at the facility level. The outputs were Real Property Inventory reports, planning documents and estimates of maintenance funding requirements. Data on "prospective assets" (from funding to usable completion) were introduced by interface with the Construction Management System in the Engineering Field Division Management Information System. Records for each Navy facility (land, building, structure, or utility) included data on location, acquisition, outgrants, measurements, construction, condition, utilization, maintenance, funding and disposal.

In fiscal years 1969 and 1970, there were about thirty-three man-years of effort available for Real Property Inventory and Cadastral functions at the Engineering Field Divisions. By 1974, there were approximately fifteen man-years of effort available annually for the same functions. Accomplishing those functions with reduced resources would have been impossible without the Navy Facility Assets Data Base procedures implemented in 1971. Additionally, the establishment of a single data source for planning, inventory and maintenance generated an estimated cost-avoidance of $100,000 per year. Furthermore, production of "Special Reports," on an as required basis at a cost of $100 to $300 each was a fringe benefit of the data base. These reports would have required from two to ten times as much manual effort.[34]

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[34] Navy Facilities System.

Shore Facilities Planning Management Information System

The Shore Facilities Planning Management Information System was an information system which provided automatic data processing support to the shore facilities planning process. It was composed of data systems which recorded approved facility requirements and compared those requirements with adequate and prospective assets. The resulting information on deficiencies and excesses was used to establish the basis for and validation of the Navy Military Construction Program and the Annual Facility Excess Plan. The logic of peacetime shore facility planning was extended to Base Development Planning and the Base Development Studies Program, both in support of contingency operations. Several automated models were included to assist planners with the determination of peacetime and contingency facility requirements.

The initial justification for automation of shore facilities planning stated that an equivalent, manual system would have required 176 man-years of annual effort at the Engineering Field Divisions and at Command Headquarters. In 1968, there were sixty-nine man-years available, and it was estimated that eighty would be required to operate the automated system. However, at the end of 1974, the system was being operated with only fifty man-years of effort. This amounted to a cost-avoidance of approximately $600,000 per year. Additional cost savings were realized by the validation of military construction projects which produced an estimated cost-avoidance of $1.5 million

per year and by the elimination of the Triennial Inventory which was estimated to save the Navy shore activities $1 million per year. Still further savings were realized by the use of the Pilot Training Model. By using this model it was possible to avoid procurement costs for jet aircraft which were to be used in the aviation training program. By a manual method, the requirement for basic T2C and advanced TA-4 jet trainers was determined to be forty and sixty aircraft respectively. With the Pilot Training Model, an error in the mix was discovered. The correct mix of aircraft turned out to be seventy basic jet trainers and forty advanced trainers. On the basis of acquisition costs of $750,000 for the basic aircraft and $1.3 million for the advanced aircraft, a total cost avoidance of $3.5 million was realized.[35]

Military Construction Programming Management Information System

Data on military construction projects as recorded on OPNAV Form 11000/4 by each Navy shore activity, were submitted via each activity's chain of command. Project priorities within and among related activities and functional, geographical, or special investment programs was assigned by major claimants, investment program proponents, or the Chief of Naval Operations as appropriate. Data submissions were

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[35] Navy Facilities System.

reviewed, validated, and disciplined by the Command prior to updating existing mechanized files. Various summaries of deficiencies by investment categories and investment programs were generated for analysis and determination of balanced deficiency correction rates with each program package. Parametric priority weighting factors, investment program correction rates and budgetary constraints were introduced to structure the projects into five-year investment programs. Subsequent authorization, approval or disapproval and changes in priorities were constantly posted to the data base as the program evolved through its iterative technique.

Benefits from this system included formulated programs which could be presented to the Naval Military Construction Review Board for review and proposed changes which were decided upon by the board chairman. Overnight response to produce new error-free reports of the previous day's action was taken for granted. In any event, the time of the board's sessions was reduced from four or five weeks to three or four days. Furthermore, frequent distribution of the program objectives to show most probable candidates for the next year's program eliminated documentation of hundreds of projects each year which were shown to have no chance of being programmed. In 1968, 3,000 hours of overtime were spent on programming. In 1973, because of improved management capability, overtime amounted to only 200 hours.[36]

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[36] Navy Facilities System.

Civil Engineer Support Management Information System

The Civil Engineer Support Management Information System provided the Command and the Civil Engineer Support Office with information necessary to manage the material stocks and manpower resources which supported the Naval Construction Force. Users of this information included Command Headquarters, units of the Naval Construction Force, the Construction Battalion Centers, the Bureau of Naval Personnel, the Ships Parts Control Center, the Fleet Material Support Office and the Marine Corps. The major subsystems were: Inventory Management, Advanced Base Functional Component/Table of Allowance, Material Requirements Planning and the Fleet Naval Construction Battalion Management Information System.

Benefits obtained from the system included a cost-avoidance of four and one-half man-years of manual labor for the preparation of status reports on Command funded procurements; assistance to the Naval Construction Force and the Reserve Naval Construction Force unit commanders in utilization of their Group VIII personnel through quantification and inventory of skill levels and training requirements; a capability to prepare inventory aids supporting Naval Construction Force Tables of Allowance based upon Advanced Base Functional Component/Table of Allowance data base; and availability of preplanned engineering design data to respond to urgent facility requirements in peacetime or wartime.[37]

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[37] Navy Facilities System.

Construction, Automotive and Special Equipment Management Information System

The Construction, Automotive and Special Equipment Management Information System was a comprehensive equipment management information system developed by the Command to assist in management of the Navy's total population of construction, automotive and special equipment. This system embodied improved management and computer techniques to facilitate the control of equipment through an entire life cycle from the compilation of Navy equipment requirements, through the acquisition, utilization and disposal processes. The system utilized a centrally processed data base containing registration records for the total world-wide inventory. The major subsystems were Inventory and Registration; Planning, Programming and Budgeting; and Operation and Maintenance.

The Civil Engineer Support Office at the Naval Construction Battalion Center, Port Hueneme, California, was responsible for this system's data management. Input was introduced to the Construction, Automotive and Special Equipment Management Information System data files through a data collection system or from external files. Input data was purified by using edit routines and manual checks. Data identified as erroneous was manually corrected and reentered. A primary objective of the System's data management was to provide single channel collection of source data with the broadest possible use in display and feedback.

The Civil Engineer Support Office insured that common data elements were used throughout this management information system so that duplicate data was not stored and data files could be cross-referenced.[38]

Public Works Department Management Information System

Public works was a Command responsibility at Navy shore activities. The Command was responsible for providing public works technical guidance in such a way that uniform public works management procedures would be effected throughout the Navy. The Public Works Management Information System was a tested and proven set of management specifications that were promulgated to establish uniform management procedures. The major subsystems were: Maintenance, Utilities and Transportation.

No complete automated data processing system could successfully embrace the numerous variously sized, tasked, financed, and equipped public works departments within the Navy shore establishment. Therefore, the Command only maintained standard management documentation for Navy-wide application. Shore activities selected Public Works Department Management Information System data systems for use, and activity programmers used available automated data processing documentation and flow charts to mechanize the system. A prototype of the Systems Emergency Service, Control Inspections and Preventive

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[38] Navy Facilities System.

Maintenance Inspections was installed at the Naval Ordnance Station, Indian Head, Maryland.

The initial indications from the Indian Head Station prototype installation pointed to several benefits for the two installed data systems. However, at the end of 1974, these savings could not be quantified in terms of dollars or of manpower reductions. Other benefits included a reduction in the number of emergency/service work authorizations in backlog from approximately 200 to approximately 30. Furthermore, the average age of emergency/service work authorizations was reduced from over thirty days to about fifteen days. In addition, public works maintenance managers were assured that all facilities scheduled were covered by control inspection, and all pieces of "vital" production/mission oriented equipment scheduled were covered by preventive maintenance inspections.[39]

Environmental Quality Data System

The Environmental Quality Data System was a collection of data systems which provided support to the Navy Environmental Protection Support System. Inputs ranged from measurements of pollution in the ambient environment (air, water, shore) to indices of legal requirements and documents. The objective was to create a central, official source of data to show the extent to which the environment was

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[39] Navy Facilities System.

affected by Navy aircraft, ships and shore installations. Some of the systems were: Wastewater Monitoring, an Activity Pollution Source Inventory, Legal Requirements, Environmental Information Retrieval, Oil Spill Reporting and Pollution Control Projects Reporting. The Naval Air Systems Command and the Naval Ship Systems Command also operated data systems that were a part of the Environmental Quality Data System.

An automated data system development plan was initiated in 1973 to document costs and benefits for each data system in the Environmental Quality Data System. Each of the Naval Environmental Protection Support Service functions was analyzed to determine whether manual, partially automated or fully automated processing was most cost effective. These initial analyses were re-evaluated in annual updates of the automated data system development plan to be sure that actual experience did not contradict the initial assumption and indicate a different decision on processing.[40]

Engineering Research System

The Engineering Research System provided automated scientific and engineering data processing for the Civil Engineering Laboratory, Naval Construction Battalion Center, Port Hueneme, California. This system

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[40] Navy Facilities System.

included automated design process control, information retrieval, analysis and design services for research, development, test and evaluation projects at the laboratory. These services were implemented through conversational, alphanumeric and graphic applications. The objective was to foster, encourage, promote and support research related to the mission of the laboratory.

The benefits of this system are typified by the following examples. Research, development, test and evaluation projects amounting to about 37 percent (or $5 million) of the laboratory's workload required scientific and engineering automated data processing support. A study of the projects using automated services indicated that 19 percent (or $2.6 million) of the Laboratory's workload could not have been undertaken without access to a very large automated data processing system. An additional 16 percent (or $2.1 million) of the Laboratory's workload could have been undertaken but with a higher cost and an increased number of professional personnel if adequate processing had not been available. The study also showed that 60 percent (or about $3 million) of the expenditures for projects using computers was for labor, whereas only 3 percent (or $157,000) was associated with scientific and engineering automated data processing. Therefore, the benefits obtained included being able to accomplish research, development, test and evaluation that could not otherwise be undertaken; being able to conduct research, development, test and evaluation at a lower cost than was possible through manual or traditional techniques,

and being able to conduct research, development, test and evaluation in a shorter time and greater depth of analysis with increased accuracy.[41]

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[41] Navy Facilities System.